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ABSTRACT

This report reviews the goals, operating system, and development plans as of spring 1978 for the Bibliographic Automation of Large Library Operations using a Time-sharing System (BALLOTS) program, an online interactive library automation system developed by Stanford University in 1967. Five primary goals that will guide the operations and development activities of BALLOTS over the next several years are detailed, as well as two immediate objectives. The present BALLOTS system, which supports the technical processing activities of acquisition and cataloging in an integrated manner, is described in terms of services (which include searching, acquisitions, and cataloging), the character set, user support, cataloging standards, and system integrity. Major development projects of the BALLOTS Center for 1978 and 1979 are outlined, including the Network File System, the Authority Control System and Synchronous Communications System, Library Management Information Program, Book and Microform Catalog Interface, and Research and Development on Retrospective Conversion. A history of BALLOTS and a list of shared cataloging users in April 1978 are appended. (CWM)

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BALLOTS

Stanford University's Library Automation and Information Program

STATUS REPORT

April 1978

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CONTENTS

Introduction -- 1

Program Goals of BALLOTS -- 2

BALLOTS Today -- 9

BALLOTS By the End of 1978 -- 24

BALLOTS By the End of 1979 -- 30

APPENDICES

A. History of BALLOTS -- 33
B. BALLOTS Accounts in April 1978 -- 36

INTRODUCTION

BALLOTS (Bibliographic Automation of Large Library Operations Using a Time-sharing System) is a computerized library system originally developed by Stanford University in 1967 to help its libraries meet the growing demands of the information explosion with on-line technical processing. Since its inception, the BALLOTS system has been steadily expanding and now provides storage and retrieval of bibliographic information, in addition to a wide range of technical processing services, to libraries and library systems of all types throughout the country.

Since 1977, the development of BALLOTS has been particularly dramatic in terms of system design, network membership, and program goals. To convey the expanding design of the entire BALLOTS project and to bring the educational community up-to-date with recent developments, the following status report has been prepared. The main text outlines the five primary goals of BALLOTS, describes the system at present, and reviews plans and objectives through 1979. The appendices include a brief history of the program and a list of institutions with BALLOTS accounts in April 1978.

PROGRAM GOALS OF BALLOTS

In 1977 Stanford University, recognizing the increasing importance of bibliographic services and library networks for scholars, made BALLOTS a high-priority program and an independent project of the University, reporting no longer to the computer center, but to the chief academic officer. As part of this re-organization, Stanford has established five primary goals for BALLOTS that will guide its operations and development activities over the next several years. These goals are:

1. to provide the scholar with a sophisticated means of accessing bibliographic information;

2. to provide a large library with automated bibliographic control and with related management information;

3. to provide a large library with a means of mitigating the ever-increasing costs of information transfer;

4. to provide the community of large libraries with a network for the sharing of resources;

5. to provide all libraries with automated bibliographic services.

Within these goals, the University has established two immediate objectives for the BALLOTS program:

1. to establish an environment within which the BALLOTS program may evolve into a national information network addressing the particular needs of research universities and their libraries.

2. to establish an environment within which the BALLOTS program might evolve into a bibliographic utility supporting the technical processing requirements of all types of libraries within California;

A brief review of the goals and objectives of the BALLOTS program may assist those interested in understanding Stanford's fundamental interest in this activity.

Goals

1. To Provide the Scholar with a Sophisticated Means of Accessing Bibliographic Information

The impact of the "information explosion" on universities and their libraries--the increases in the acquisitions budgets and in the cataloging backlogs of academic libraries--suggests that the scholar faces increasing complexities in attempting to find the pieces of information most relevant to his research and instructional needs. The university is itself an information resource and the provision of information in a timely, sophisticated, and economical manner is critical to its academic programs. Thus, Stanford University has directed the BALLOTS program to focus on the informational needs of the scholar--the faculty member and the student--in research universities, academic universities, and colleges that desire additional support in facing this information explosion.

The commitment to the scholar is, in some measure, an ideal. Its intent, however, is to guide the officers of the BALLOTS program. That is, this concept serves as a constant reminder of the purpose of the work being done by the BALLOTS Center.

2. To Provide a Large Library with Automated Bibliographic Control and with Related Management Information

If a library is to meet its objective of making information accessible to scholars, it must be able to manage all forms of information flowing into it. Of particular concern is bibliographic information, and the BALLOTS program is dedicated to providing technical support to the library as it, in turn, provides bibliographic information to patrons. Included in this function is cataloging support and, as long as necessary, catalog card production. But catalog cards, and in fact the card catalog itself, should in due course be replaced by some other means of accessing bibliographic information. Thus, the BALLOTS program is committed to supplying alternative methods of bibliographic control to provide such information to patrons.

The BALLOTS program is dedicated to the development of management information programs that will provide the director of the library with tools to understand the place of the library within the parent institution, to operate in the present, and to plan for the future. Drawing from cataloging, acquisitions, interlibrary loan, and circulation systems, the BALLOTS management information program will provide the library director

with data to address such questions as collection development, shared collections development, staffing requirements, problems of patron access, and control of resources used by patrons. Particular attention will be focused on financial data and on collecting data necessary to analyze the growth of the library's collection. The management information activities of the BALLOTS program are still embryonic, but will become an operating component of the system over the next 36 months.

3. To Provide a Large Library with a Means of Mitigating the Ever-increasing Costs of Information Transfer

A library automation program like BALLOTS cannot reduce in absolute terms the cost of providing information to scholars in research universities. Such a program may, however, be able to reduce the growth rate of those costs, while simultaneously providing new services required because of the increasing complexity of accessing information. The University has committed the BALLOTS program to research and development efforts concerning the economics of libraries and of information; the program will focus on ways to assist a library director's attempts to bring library operations into financial equilibrium.

4. To Provide the Community of Large Libraries with a Network for the Sharing of Resources

A traditional purpose of library automation programs is to establish a network of users in a way that will enable a variety of libraries to share in the cost of cataloging material acquired by each participating institution. BALLOTS is committed to this purpose in its operating and planned software and through the provision of Library of Congress MARC records to support cataloging efforts, as well as through encouraging original cataloging from member institutions.

The BALLOTS system was originally designed and implemented to permit capture and utilization of the richest range of information--not only LC MARC material, but all of the additions and variations to cataloging to be found in each user's contributions to the data base. Every member library of the BALLOTS network shares its on-line cataloging data (and in Stanford University Libraries' case, its acquisitions data as well) with all the rest. The new BALLOTS record, index, and file structure being developed for use by the end of calendar 1978 will continue and improve this service, by making it even easier for BALLOTS users to locate desired materials in a growing data base of larger scope, and by making plain what standards were followed in any cataloging data retrieved.

To provide its users with the highest-quality data possible, BALLOTS' pricing structure includes an incentive to those institutions undertaking original, complete cataloging; there is a financial disincentive for incomplete cataloging. Stanford's decision to establish such a pricing structure is consistent with its dedication of the BALLOTS program to a bibliographic data base of the highest quality.

A desirable feature of library automation programs is the ability to enter into shared acquisitions on a regional or national basis, if appropriate. BALLOTS currently supports the acquisition activities of the Stanford University libraries and will generalize an acquisitions system to support a network of users sharing acquisitions data. Whether the generalized shared acquisitions system will be similar to the current system has yet to be determined. The decision to provide a network acquisitions system, however, stems from the need of libraries to enter into shared collection development to conserve resources (both the libraries' and their parent institutions').

The University intends the BALLOTS program to embark on other support activities over time, such as interlibrary loan and circulation--also traditional desiderata of library automation programs. These activities are consistent with the goal of providing the scholar the means of accessing information, and such services will be developed to improve libraries' ability to serve the scholar.

But perhaps the most important function that can be performed in the context of a library automation network is to research and develop further means of meeting the needs of libraries and their scholars. Stanford University has committed BALLOTS to undertake such research and development, and is creating a separate division within the organization to be devoted to these efforts. As other library automation programs are doing, BALLOTS will take account, in such research and development, of AACR 2 and other national bibliographic standards, and the Library of Congress's proposed closing of its card catalog. BALLOTS will study the impact of such standards and actions on the scholar, and its research and development will give high priority to the requirements of patron--scholarly--access, to bibliographic data bases, indeed to information data bases of all types.

5. To Provide All Libraries with Automated Bibliographic Services

Stanford's objectives are to support the needs of research libraries nationally and of all libraries within California. Although these objectives have priority, the University intends, where possible, to offer BALLOTS functions to any library that wishes them.

Objectives

1. The Research Library Network

Approximately 100 libraries in this country, along with the Library of Congress, form a peer group of institutions having specific and similar information requirements. These institutions, generally represented by membership in the Association of Research Libraries, face demands from their faculty and students for bibliographic information of an esoteric and extensive nature. Stanford University believes that the BALLOTS program offers the technical and managerial capacities to support such information requirements. The University, therefore, has directed the BALLOTS program to support the bibliographic information requirements of research university libraries, both in operation and in research and development. That is, the University believes that BALLOTS should evolve into a research library network that provides a common bibliographic data base supporting these institutions and created largely by them. The research libraries in this network will establish the standards for the data base and the products delivered by the organization.

2. The California Network

Looking at its position in California and its responsibilities to neighboring institutions, Stanford University has committed BALLOTS to develop into the bibliographic utility for libraries throughout the state. Stanford believes that in meeting the needs of research libraries, it will be able to meet the needs of all types of libraries in California as well. Moreover, there are economies of scale in such an activity. Stanford believes that California libraries will be well served by joining with research libraries on a national level in the development of a technical processing program and a research and development effort to meet library information needs.

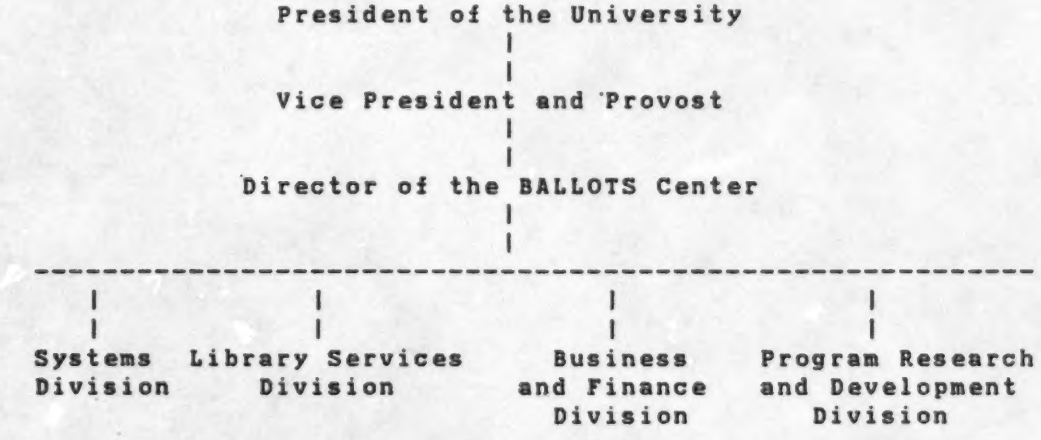
* * *

These five goals and two objectives, then, shape the structure of the BALLOTS program within which the professional staff of BALLOTS work. In all instances, the University intends that the development of the BALLOTS program be directed by the library profession, which will establish the program's standards and be the focus of the program's priorities.

Although BALLOTS provides technical processing support for cataloging and the production of catalog cards for member libraries, Stanford University's purpose in continuing the

development of BALLOTS has, as the goals noted above suggest, a more profound basis. The University believes that providing adequate information to support its academic programs will become more complex and more costly as the years go by. It believes that the BALLOTS program offers a means of easing the difficulties of providing informational support for the University's activities and of mitigating cost increases from these efforts. The University does not intend the BALLOTS program to compete with other library automation programs in the traditional sense of the word. Rather, the University intends that BALLOTS continue to provide a complete and extensive collection of data bases that reflects the requirements of research universities. This data base collection will contain not only bibliographic records corresponding to the holdings of its member libraries, but also broader classes of machine-readable information, such as that currently supplied by abstracting and indexing services, and also directories to publicly available experimental data files. Access to data bases in the collection will differ according to the kind of information the data base contains, and will be sufficiently flexible to allow research libraries and their patron scholars to retrieve relevant information quickly and easily in a format appropriate to their need.

Within the administrative structure of Stanford University, BALLOTS is an independent program, receiving University support and direction and reporting to the President through the Office of the Provost. The organizational design of BALLOTS comprises four divisions reporting to the Director, as illustrated below:



The Systems Division contains three units--Development, Communications, and Applications--which design, implement, and manage the BALLOTS system. The three units of the Library Services Division--User Services, Library Systems Analysis, and

New Account Coordination--work directly with system users, coordinating BALLOTS services with the needs of the libraries. The Business and Finance Division oversees all financial activity and provides long-range program forecasting. The Program Research and Development Division is not yet staffed, but will provide analysis of requirements of libraries in the future, supported with pure and applied research.

These four divisions, integrated by the Director, provide the structure for the BALLOTS program to meet the needs of research libraries nationally and of all libraries in California.

Stanford University is fortunate to have an unusual combination of strengths in computer science, communications, its computer center, and its research library. The integration of these components by its academic officers has allowed Stanford to develop the BALLOTS program and nurture it so that by the end of 1978 it will be represented by a national operational network. The University has committed its resources and the talents of its officers and professional staff to the operation of this program in support of research universities and their libraries at a national level; reflecting its location within California, the University has committed similar resources and talents to the creation of a California network and bibliographic utility.

BALLOTS TODAY

BALLOTS is an on-line interactive library automation system that supports the technical processing activities of acquisition and cataloging in an integrated manner. At present, shared cataloging services are available to all network users; the acquisition system is limited to Stanford University Libraries until further system changes are implemented.

On-line service is offered from 8:30 a.m. to 10:30 p.m., Pacific Time, Monday through Friday; noon to 10:30 p.m., Saturday; and noon to 10:30 p.m., Sunday, as time required for system maintenance permits. System maintenance, including MARC File additions and Catalog Data File indexing, as well as batch operations such as printing of output, are performed during the night and on weekend mornings so that libraries are free to use the system during normal daytime business hours.

The foundation of the BALLOTS system is the bibliographic record. Additional data can be appended to the bibliographic record to designate acquisition status (in-process data) and/or to designate collection status (holdings data). A record is said to belong to a particular BALLOTS file depending on which type of additional data is appended to the bibliographic record. The four files are the BALLOTS MARC (MRC) File, the In Process File (IPF), the Catalog Data File (CDF), and the Reference File (REF). Access to the files is provided through indexes. The particular access points for a record depend on the file to which the record belongs.

In Process File records contain some bibliographic information as well as acquisition information on titles being acquired by Stanford through BALLOTS. Catalog Data File records contain bibliographic and holdings information for titles cataloged through BALLOTS by Stanford and by all other libraries participating in BALLOTS' shared cataloging service. Reference File records are "see", "see also", and explanatory cross-references created by Stanford for its records in the Catalog Data File. Each record contains a holding symbol that clearly identifies the library that entered it; although other libraries may use the record, their use cannot affect the record in any way.

The user interface is divided into logical pieces called "functions" in order to allow the system to prompt the series of actions most commonly used to process an item, from before the decision to purchase until the item is ready to circulate to library patrons.

The command language used by BALLOTS is based on natural language text and requires no previous computer experience on the part of the user. The data display formats vary from a replication of a catalog card, to brief bibliographic information along with holdings information, to a record fully tagged with MARC indicators and delimiters. Formats used for data input are designed to facilitate the use of the system by paraprofessional employees.

Services at Stanford

Two versions of BALLOTS are currently in use: the system used by Stanford University Libraries,* and the system used by institutions outside Stanford, including on-campus coordinate libraries like the Stanford Law Library, Hoover Institution, and Lane Medical Library. For this second group of users (often referred to as "network" users in BALLOTS Center publications), the system is accessible in two "modes", depending on the type of terminal and communications connection used; the services offered in each mode are essentially the same, however, and are (at present) less extensive than those possible in the six units of the Stanford Libraries.

The version of BALLOTS presently used only by Stanford University Libraries is the most extensive, containing virtually all BALLOTS features. It is the on-line support system for SUL's acquisition and cataloging activities.

The system is flexible enough to accommodate many variations in processing. Without attempting to discuss a number of special cases and how they would be handled, the following description outlines the general flow of material through the total system at Stanford.

The process of acquiring a particular item begins in the order function with searching the files to determine if an acquisition request is for an added copy. A search request is first tried against the Reference File (REF). If no result is found, the system will automatically try the request against the Catalog Data File (CDF) belonging to the library. If no result is found here, the system tries the In Process File (IPF). If again no result is found, the system goes to the BALLOTS MARC

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*The Cecil H. Green Memorial Library, J. Henry Meyer Memorial Undergraduate Library, Engineering Library, Falconer Biology Library, Music Library, and Cubberley Education Library.

(MRC) File. If still no result is found, the system finally tries the request against the combined CDF's that belong to other libraries contributing cataloging to the BALLOTS data base. If a searcher finds a record for a title to be ordered, he or she adds to it acquisition data such as vendor, requester(s), and budget account code. This data is input using a programmed order input format displayed on the video terminal. If no bibliographic data is found, the searcher first keys in whatever bibliographic data is available (e.g., book catalog copy, dealer catalog data, etc.) on a programmed bibliographic input format, and then goes to the order input format to enter the acquisition data. Either activity creates a new record in the IPF. An overnight batch program prints a purchase order and a dealer report slip. Acquisition data can be added to records already present in the CDF or IPF for added copy or added volume orders. In all processing activities, an on-line editing program immediately verifies data input by the user and redisplays faulty data flagged with error codes. The system will not accept the data for processing until these errors have been corrected.

Whole or partial orders can be claimed or canceled at any time in the automated system. Claim letters and cancellation notices can be produced overnight as a result of data keyed into IPF records. Claim letters and cancellation notices are also produced automatically by the claim program, which is run weekly.

When received, items are checked in so that their receipt is recorded in IPF records. Both partial and complete receipt of orders can be recorded on an acquisitions matrix format. Records for which all cataloging and holdings data are present may be cataloged at this time, using the bibliographic and holdings input formats. (This "processing in receipt" completes the technical processing of the item before it reaches the Catalog Department.) Catalog data slips (technical processing slips containing both bibliographic and acquisitions data) are produced overnight when items received are not immediately cataloged. Requester notices are also printed at this time.

If an item is within the scope of LC MARC but no data is found at the time of order or receipt, the library may choose to initiate an automatic standing search of the MRC File for that title. The system checks this standing search request (SSR) against the MRC File once each month. If a match is found, the search request and the MRC record are printed out as a "matched SSR notice" and delivered to the library.

Items received are routed and controlled throughout their time in the cataloging process. Codes are added to the acquisitions data denoting the location of an item in process.

Items received in the library through processes otner than ordering, such as gifts, exchanges, and cataloging arrears, may be entered into the automated system by adding them to the IPF when it is desirable to track such items during processing; or they may be entered directly into the CDF by the cataloging staff.

The acquisition data is purged and the in-process status is removed from the records automatically when all items for a particular order are received and cataloged; that is, holdings data for each item in the IPF has been added to the CDF. Thus, the same bibliographic record is used to record both the acquisition and in-process activities and the cataloged holdings for a particular item.

To catalog a book, a cataloger makes any necessary changes to the bibliographic data on-line, verifies the expected shelving location, and adds the copy number. The source of the bibliographic data is indicated whenever it is displayed. The bibliographic descriptions of items cataloged may come from various sources, e.g., LC MARC records, LC or NUC book catalog copy, Title II cards, LC proof slips, copy contributed to the data base from another library, or original cataloging copy. Formats for control information, bibliographic description, and holdings are used.

When cataloging input activity has been completed, the BALLOTS batch programs produce the required catalog cards. Cards are printed on high-quality card stock; the full American Library Association print train is used to produce all necessary characters, punctuation, and diacritical marks. The cards are produced sorted and ready for filing into the appropriate catalog.

At any time after a book has been cataloged, the bibliographic and holdings data may be modified on the holdings update format, and new catalog cards requested. Reclassification, recataloging, transfers, discards, and other catalog maintenance changes may also be done. The new status of an item will then be shown in the CDF record for that title.

The three major services of BALLOTS that enable the user to do all of this are searching, acquisitions, and cataloging. These are described in more detail below.

SEARCHING:

The data base, its flexibility, and its accessibility, are the heart of BALLOTS service.

The BALLOTS data base consists of two on-line computer files. The first of these is the BALLOTS MARC File. This contains over half a million monograph records in BALLOTS record format from the Library of Congress MAchine-Readable Cataloging (MARC) program, from January 1, 1972, to the present. As each MARC tape is received from LC (normally once a week), it is converted and added to this file. The second file is one physical entity that contains three kinds of records; for the sake of distinguishing among these, reference is often made to three different "logical files"--the In Process File, the Catalog Data File, and the (Cross-)Reference File. This second file is added to daily by Stanford and other BALLOTS shared cataloging libraries and is fully indexed during the night.

The indexes that can be used to find records in the data base depend on the type of record for which the user is looking--a MARC record, an in-process record, or a cataloged holdings record. The total array of access points provided by these indexes are: (1) personal name (PN), (2) corporate/conference name (CN), (3) title word (T), (4) Library of Congress card number (CRD), (5) BALLOTS unique record identification number (ID), (6) call number (CAL), (7) subject heading--complete or truncated (S), and (8) International Standard Book Number (ISBN). The matrix below shows the access points that can be used in each file.

(X means the file is indexed by index shown on left;
- means the file is not so indexed.)

	File			
Index	MRC	REF	CDF	IPF
PN	X	X	X	X
CN	X	X	X	X
T	X	X	X	X
CRD	X	-	X	X
ID	-	X	X	X
CAL	-	-	X	-
S	-	X	X	-
ISBN	X	-	-	-

The user searches the data base in the course of a number of technical processing activities. (Stanford Libraries also have terminals in their public service areas where the files are searched by reference department staff in response to patron requests for certain types of information.)

Pre-order searching is done in order to verify that a title desired is not already held (if it were, a record for it would be found in the CDF) or is not in the process of being ordered and cataloged (a record for it would be found in the IPF if this were the case). Another reason for pre-order searching at Stanford, in addition to this initial checking, is to locate sufficient bibliographic information in a BALLOTS file to generate a computer-produced purchase order and a new or updated IPF record.

Searching is also part of updating an IPF record as the processing of an item progresses. For example, once an order has been created for a title, the appropriate staff member will search for and update this record when the item is received and send the item to the Catalog Department. There, a cataloger, or a staff member working from a cataloger's worksheet, will search for the record again, complete or correct the bibliographic description, and add holdings information in order to turn the record for an item into a CDF record. The record will then be used to produce catalog cards and spine labels through BALLOTS batch programs.

Searching the data base for cataloging copy can also be extended to the IPF or CDF records of other libraries.

Once in the CDF, a record may be searched for by a staff member in order to revise the bibliographic description or holdings information, and to produce replacement catalog cards.

The mechanics of searching are quite simple. The user at the terminal types in a search request composed of the basic search command, "find"; the abbreviated name of the index to be searched; and a value or values to be located. For example, one might key "find pn Leonard Woolf" ("pn" means "personal name"). This search will be tried against each of the files in turn; when a result is found, it will be displayed at the terminal. When no result is found in one file, the search will be automatically tried against the next file in line, continuing this process until either a record or set of records is found, or the system determines that no records indexed by the value specified exist anywhere in the data base. When a search has located more than one record, the system displays the number of records found, and in which file they are stored.

When a search results in records found in one file, and the user wishes to go on and search other files, the user issues the command "resume".

The order in which files are searched is dependent on the kind of activity the user is engaged in; the user specifies this in a brief "set function" command before doing anything else. (The system normally automatically tries the user's search request against the REF File before the CDF, since a reference record may be found that will cause the user to rephrase the search.)

By incorporating Boolean operators ("and", "or", "not") in a search request, the user can make a search broad or specific; these operators can be used to combine indexes in a single search request as well. For example, one might key "fin pn virginia woolf and not t waves" ("t", of course, meaning "title"). This search would retrieve all works by Virginia Woolf in the data base except those with the word "waves" in the title. The values given for any index searched may be truncated in order to enlarge the range of results possible and to prevent uncertainties about spelling a full name or word from hindering a search.

If a record is not found for material that is in the scope of LC MARC, a searcher may choose to issue the "keep" command to initiate a standing search. These search requests as input by the user are stored by the system in the Standing Search Request (SSR) File and tried against additions to the BALLOTS MRC File by the batch standing search request program. This program is run on the third weekend of each month.

The search request record will be kept in the SSR File for a designated period unless it is successfully matched before that time. Three months is the default period. The user may optionally specify an alternate number of months for retaining the search by keying a number after the command.

Standing searches are removed from the SSR File automatically when (1) a match against a single MARC record is made or (2) the time limit for the search request has expired. Standing searches may also be deleted when the user chooses, by issuing the "remove SSR" command.

When the user has a set of records to look at in response to a search request, the system provides "paging commands" for looking through the search results, as well as a choice of display formats. The basic formats permit the user to see a very brief subset of information from the record; a presentation of

the record's contents similar to a catalog card; a fairly complete display of the record's contents with any holdings information appended; or a list of all the information in the record prefixed by data element mnemonic tags.

ACQUISITIONS:

The primary objective of an acquisition system is to control the flow of material from various sources into a library. The purpose of this control is (1) to maintain a record of the status of material, from the point of request or receipt through cataloging and shelving in the stacks, and (2) to coordinate acquisition with user requests, available book funds, vendor arrangements, and the library's holdings. The acquisition system accommodates a variety of acquisition modes and types of material. The system must handle wide fluctuations in work loads, a number of languages, and communications with requesters, vendors, and other library departments.

The BALLOTS acquisition system as it is implemented at Stanford accomplishes these objectives by offering the Acquisition Department staff the choice of several computerized functions in which to perform their work. The system is described below in terms of the services offered through each of these functions. They are: ORDER, FORCE CLAIM AND CANCEL, MATERIAL RECEIPT, NON-PURCHASE ORDER MATERIAL RECEIPT, IN-PROCESS MATERIAL DISTRIBUTION, and the AUTOMATIC CLAIM/CANCEL process.

THE ORDER FUNCTION -- This function permits searching of the on-line files to determine correct citations, current holdings, and availability of bibliographic data for an item the library intends to purchase. If bibliographic information exists for such an item, acquisition information is simply added to the bibliographic data. This addition causes the production of a purchase order and either updates an In Process File record or adds a new record to the file. If no bibliographic information is available in the on-line files, such information as is available can be keyed in.

The acquisition cycle is supported for print and non-print media for the following types of purchase orders:

regular purchase orders (including closed terminal sets)
prepayment purchase orders
deposit account purchase orders
monographic sets (standing orders)
serials
standing orders for materials classed as separates
form selection orders

Multiple forms for out-of-print vendors of desiderata and for recording decisions not to purchase can also be produced in the ORDER function. Records describing out-of-print desiderata that have not been located may be removed from the IPF in this function.

Printed outputs produced from this function include:

Purchase Order/Dealer Report
Search and Quote Notices
NPAC Notices
New Title Order Slips
Alert Slips
Fund File Slips

THE FORCE CLAIM AND CANCEL FUNCTION -- This function provides for the claiming and canceling of individual items independent of the automatic claiming and canceling cycle. First, second, and standing order claims and cancellations may be requested. Items may be removed from an order record, or the entire record may be removed from the In Process File. Reports from the vendor may also be recorded in the file in this function. General acquisition data base maintenance may also be done in this function.

Printed outputs produced from this function include:

Cancellation/Confirmation Notices
Claim Notices (First, Second and Standing Order)
Cancel File Slips
Void Slips

THE MATERIAL RECEIPT FUNCTION -- This function provides for the receipt, by individual item, of all material that can be ordered in the ORDER function. Catalog data slips for catalogers are produced automatically for each item received. Provision is made for the user to produce an invoice alert slip for material that arrives before its invoice. Material may be cataloged in the RECEIPT function.

Printed outputs produced from this function include:

Catalog Data Slips
Catalog Worksheets
Invoice Alert Slips
Requester Notices
Title II Slips
Fund File Slips

THE NON-PURCHASE ORDER MATERIAL RECEIPT FUNCTION -- This function permits adding records to the In Process File for the following types of material:

blanket orders
approval items
university press orders
gifts
exchanges
catalog department arrears

The process of adding a record in this function is the same as described in the ORDER function except that the end product is a catalog data slip for the cataloger rather than a purchase order.

Printed outputs produced from this function include:

Catalog Data Slips
Catalog Worksheets
Requester Notices
Title II Slips
Fund File Slips
NPAC Notices

THE IN-PROCESS MATERIAL DISTRIBUTION FUNCTION -- This function provides for the distribution of items to be cataloged within the Catalog Department. Material to be held for MARC data, material to be held for Title II program data, material to go to a specific area or cataloger within the department is thus routed and recorded through this function. Material for which there is appropriate bibliographic data may be cataloged in this function.

Printed outputs produced from this function include:

Catalog Data Slips
Catalog Worksheets
Title II Slips

THE AUTOMATIC CLAIM/CANCEL PROCESS -- This process provides for weekly automatic generation from the In Process File of first and second claims and cancellation notices for items on order. The claim period is determined by the user at the time he or she enters the order. If there has been no activity against a record during the claim period, a first claim notice is printed. The IPF is automatically updated to reflect this action. After the claim period has passed again, a second claim notice is printed and the record is again updated. After a third claim period has passed, if no on-line activity against the record has occurred, a

cancellation notice and Cancel File slips are printed and the order is purged from the IPF.

The library staff may alter the automatic claim cycle in the FORCE CLAIM AND CANCEL function. Recording receipt of the material in the IPF record stops the automatic claim cycle.

CATALOGING:

The primary objectives of a cataloging system are to (1) describe and classify materials entering the collection, (2) designate index entries (author, title, series, subject, special concepts), (3) create records for public and staff files, and (4) maintain those records and files to reflect changes, additions, and deletions.

To meet these objectives, the cataloging system is able to process material in many languages, in various subject fields, and with different formats and character sets as well as publication frequencies (for example, phonorecords, microtexts). The principal output is a set of records for public and staff files, usable for finding a known item or group of items with a common characteristic. The system (1) makes optimum use of existing bibliographic data, and (2) controls items while in cataloging process.

The BALLOTS cataloging system as it is implemented at Stanford provides these services to the Catalog Department through the CATALOG, MAINTENANCE, REFERENCE, and RESERVE functions. The services offered through each of these functions are described below.

THE CATALOG FUNCTION -- This function permits searching the on-line files to determine correct citations, current holdings, and availability of bibliographic data for an item to be added to the library's collections. If bibliographic information exists for an item that the library intends to catalog, holdings information is simply added to the bibliographic data. This addition causes the production of appropriate catalog cards and either updates a Catalog Data File record, changes an In Process File record to a CDF record, or adds a new record to the CDF. If no bibliographic information is available in the on-line files, such information is keyed into the CDF.

The cataloging input formats used for on-line record creation are divided into four parts permitting rapid access to a specific data element if one is to be modified. The four video screen formats for such work are:

Bibliographic Control Format--containing fixed and flexible LC MARC tags;

Bibliographic Input Format--containing the main entry and description proper;

Additional Bibliographic Input Format--containing the record notes and tracings;

Holdings Input Format--containing the local call number, location, and various local data.

Printed outputs produced from this function include:

Catalog Cards - Shelf List
Catalog Cards - Main Entry
Catalog Cards - Added Entry
Catalog Cards - Multiple Location
Catalog Worksheets
Spine Labels

THE MAINTENANCE FUNCTION -- This function provides for the maintenance of both the on-line and the card catalog data bases. Changes to the bibliographic and/or holdings portions of the record can be made. New catalog cards and spine labels may be requested. Reclassification, recataloging, transfers, discards, and other catalog maintenance changes may also be done.

THE REFERENCE FUNCTION -- This function permits the addition and maintenance of reference records in the Reference File. "See", "see also", and explanatory text references are supported. These reference records facilitate the use of the Catalog Data File. The REF File can be used by Stanford catalogers to verify the correctness of a form of heading to be used in cataloging. Catalog cards can be produced. These cards are produced interfiled with the normal daily card production.

THE RESERVE FUNCTION -- This function permits the Meyer Undergraduate Library Reserve Processing unit to produce catalog cards for undergraduate reserve. No data is stored in any file from this function.

Network Services (All Users Outside Stanford Libraries)

The services available in the network version of BALLOTS are presently more limited--searching, which is subsumed in each of the functions described above; "shared" cataloging, in order both

to produce catalog cards and/or magnetic tapes in MARC II Communications format and to enter one's cataloging records into the on-line Catalog Data File, along with all other shared cataloging libraries'; and maintenance (updating, revision, deletion) of records stored on-line. These capabilities are, like those in the fuller version of the system, divided into named functions for the purpose of prompting the user with the appropriate screen formats and commands to support his or her activity at the terminal. Two of these named functions are, in fact, close to two used by Stanford Libraries: CATALOG and MAINTENANCE.

The three functions in "network BALLOTS" also coincide with levels of service offered to users; for this reason they represent a kind of hierarchy, in which each successive function subsumes the capabilities of the one preceding it. The following summary illustrates this.

SEARCH -- the ability to search all the BALLOTS on-line files, using the BALLOTS indexes and interactive searching capabilities. Records found may be displayed in several formats. In addition, standing searches may be run monthly against the updated MRC File.

CATALOG -- the full capabilities of the SEARCH function, plus the ability to modify a record found in the data base in order to reflect local cataloging requirements and to create new records on-line, for transmittal to the user on magnetic tape or as catalog cards. The records thus modified or input are stored in the on-line data base where they can be referenced by any BALLOTS user. (NOTE: No library user can ever alter the actual record belonging to another library; users are given copies of records found to modify when they are cataloging, and in maintenance, described below, only one's own records can be altered.)

MAINTENANCE -- the ability to modify (to update) records previously stored in the Catalog Data File under the CATALOG function and to produce necessary catalog cards. (NOTE: Added copy cataloging for records already in the Catalog Data File is done in the CATALOG function.)

The BALLOTS Character Set

Since September 1977, BALLOTS users have been able to input, store, and display records using the American Library Association complete MARC character set. All LC MARC

records added to the data base since May 1976 contain diacritics and other special characters as applicable. Users with current versions of the BALLOTS-programmed video terminal can enter and display diacritics and special characters directly. Users on general-purpose terminals can achieve the same results in their printed, tape, and stored products by using a two-character sequence corresponding to each special character or diacritic. These sequences match the placement of the extended character set on the BALLOTS-programmed terminal keyboard, so that users changing from one type of terminal to another will need a minimum of retraining.

BALLOTS User Support

The BALLOTS on-line system is supported by a staff of professionals in computing and user support. The user support staff is able to provide the following:

TRAINING - A BALLOTS library user service representative describes the system and instructs in its use during a two-day training session held at the user site. A substantial portion of the training is at the terminal.

DOCUMENTATION - Complete documentation, written by a professional documentation staff, is provided with the system, including the BALLOTS Data Elements Dictionary, the BALLOTS Network Reference Manual, and the BALLOTS Network Reference Digest. Periodic Informational Notes, revision of documents, and the BALLOTS Newsletters provide timely updates to the system documentation.

HOTLINE - A special telephone number is used to report trouble with the on-line system. It is answered on a top-priority basis by a library user service staff member during normal working hours.

BALLOTS USER GROUP - Regular meetings of BALLOTS shared cataloging users are held to provide a forum for the exchange of information between BALLOTS staff and the users and among the users themselves. The sites of these meetings vary so that users from various locations can attend when the location is convenient.

SPECIAL WORKSHOPS - As needed, workshops are held to review specific areas, such as LC MARC monographic coding.

BALLOTS Cataloging Standards

To maintain a data base of records that conform as nearly as possible to records issued by the Library of Congress in MARC format, the BALLOTS Center bases its standards for cataloging on the ANGLO-AMERICAN CATALOGING RULES, supplemented by the descriptions of Library of Congress practices announced in the LC CATALOGING SERVICE BULLETIN. It is the intention of the BALLOTS Center to continue to use the Library of Congress as a model for cataloging standards.

BALLOTS System Integrity

Stanford takes many steps to insure the integrity and recoverability of data entered into the BALLOTS system. The entire data base is transferred to tape twice weekly and one set of tapes each week is stored offsite in a protected vault. In addition, daily deferred update queues, which contain all the revisions, additions, and deletions for a given day's user activity, are transferred to tape each night before processing and the tapes kept for five weeks. BALLOTS data base update software has a checkpoint and recovery mechanism built into it; this automatically corrects the data base if a program or system failure occurs.

BALLOTS BY THE END OF 1978

The BALLOTS Center is currently engaged in several major development projects that are scheduled for installation in the latter part of this year. The Network File System and Authority Control System, Phase 1, described below, were designed during the past six months and are now being implemented. A phased transfer from the present system to the Network File System will be complete on or about January 15, 1979. The Synchronous Communications System, also described below, will improve the economy and reliability of the BALLOTS telecommunications system. Design is complete and implementation has begun; the beginning of the changeover is planned for the middle of November 1978. In addition, work on the generalization of spine label and catalog card production is in progress.

1. Network File System

a. Goals

Originally designed for use by a single institution, the BALLOTS data base structure was extended for use by multiple institutions with relative ease because of the flexibility of its original design. As the number of users grows, however, the costs of using a system designed for single institution use increase. This extension of services to a network of libraries is the impetus for the design of a file system that can serve a rapidly growing number of users more flexibly, efficiently, and economically, and that can enable the Center to provide its users with a variety of new services. Such a reorganization of the BALLOTS software also incorporates the experience gathered during the first six years of operation. The Network File Design addresses four specific issues: (1) reduction of data redundancy; (2) the ability to handle all formats defined by LC MARC; (3) improvements in the structure and functions of indexes; and (4) general efficiency improvements.

REDUCTION OF DATA REDUNDANCY. In the current BALLOTS system, when a library catalogs a book, a record is created for that library. Even if the library has copied an existing record without any changes other than the addition of holding information, a record is created. The multiplicity of records for a single book (or any other type of material) when the records do not differ, or differ only slightly, has several

adverse effects on users and the system. First, the storage requirements are increased. Projections of cataloging activity indicate that with the current system, storage could rapidly become a problem. Second, when a search is done, the user is subjected to a result stack of increasing size and many records in the result could represent the same item.

ALL LC MARC FORMATS. In order to support the many institutions requiring non-monographic cataloging, BALLOTS' new data base design incorporates all materials formats defined by the Library of Congress MARC Development Office.

IMPROVED INDEX STRUCTURE. Changes to the indexing system will be made to allow searchers to submit more contextual information to the search system, such as type of title to search and desired word order within a heading, thus eliciting more specific and relevant search results. In addition, index searching will be less expensive because of the inclusion in the indexes of some pre-coordination data.

EFFICIENCY IMPROVEMENTS. BALLOTS' current design does not achieve sufficient economy of scale in crucial areas: cost of data base storage, relevance of search results, and speed of searching. Currently, storage costs increase and search relevance decreases linearly as the data base expands. Also, the cost of building and maintaining the indexes that are BALLOTS' greatest technical strength grows more rapidly than necessary. Use of hash-coded tree indexes will increase searching productivity.

b. Changes to Existing System

The Network File System will make available many new facilities. Some of these are inherent in the changes made to the file structure; others depend on the structure but require additional, concurrent applications development.

Among the changes of the first type are the indexing changes. In addition to the greater efficiency mentioned above, the new indexing methods should give the user additional power in accessing BALLOTS records. First, the user will be able to specify word order in searching a keyword index. Second, subjects will be both keyword- and phrase-indexed, thus providing subfield access. Third, new indexes will be added to the system. Which indexes to add are still under investigation, but adding International Standard Serial Number and Key Title for serials, as well as expanding International Standard Book Number, LC class number, and subjects to all records is almost certain to be done. Still under consideration is programmed search logic that could

permit search restriction in certain circumstances by any data element.

Another change inherent in Network File Design is the clustering of all records that reflect cataloging of the same bibliographic work. At another level, all records that represent varying editions of the same work will be grouped. The grouping will have several benefits. First, search result stacks will be smaller; hence, retrieval will be more accurate. Second, searching for reference, interlibrary loan, and collection development purposes will be made easier. The system will be able to display all the libraries holding a given work or edition of a work on a single screen format. Finally, this grouping will permit increased resource sharing within the system.

This record grouping will include records of a given format (e.g., books, films, manuscripts), including records supplied by the Library of Congress. Records of different formats will be separated but jointly accessible, to provide efficient use by media catalogers while still providing appropriate access for public service use.

With the Network File System, support for all currently defined MARC formats will begin. In addition, BALLOTS will be able to support additional formats as they are defined. In support of the presently available formats BALLOTS will add to its data base all machine-readable records currently available from the Library of Congress. These will include films, maps, serials, GPO, Can-MARC, and COMARC tapes and those portions of the LC MARC books file not currently provided in BALLOTS. Those LC MARC records now in the system in an incomplete form (pre-1976) will be replaced with the complete MARC records.

With the support of the LC MARC formats other than books, come several applications changes. These changes include expansion of the catalog card program to provide cards appropriate for each format and extension of the method of storing holdings information to reflect differing types of holdings statements (e.g., serials holdings). In addition, varying call numbers by branch plus other branch-specific information will be possible with or following the implementation of the Network File System.

Because of the new LC MARC formats, new input formats will be required. These new formats will be more compact, more flexible, and more easily used than the present ones. The user will be required to use fewer formats to enter a record; the entire bibliographic portion of the record will usually be entered with one format transmission. A blending of the use of

MARC tag numbers and mnemonics is being proposed to enable users familiar with the MARC formats to use the system easily, while maintaining the benefits of mnemonics where they are most helpful.

New display formats corresponding to the new input formats are in development. Extensions to BALLOTS' Partial Data Display Format are planned, to show which libraries hold particular works and/or editions. Holding libraries will be identified in these formats, as in the rest of the system, by NUC symbols rather than by the present BALLOTS Library Identifier (LI). A new feature in BALLOTS will be menu (compressed record) screen formats to display multiple results from searches. The user will be able to select a work from a search result without having to display separately each record retrieved. This feature will also be used to permit selection of a single edition from a multiple-edition work. Of course, the present ability of a BALLOTS user to restrict a potentially large search result through Boolean logical operators will remain for those cases where a menu display is inappropriate.

To add records from the various incoming data tapes supplied to BALLOTS by LC and other sources, a generalized add/merge mechanism for the network file is being designed. This mechanism will permit adding others' machine-readable bibliographic records to the system by writing a routine to interpret the incoming records and pass them on to the add/merge facility.

The standing search facility can also be changed if desirable, to search not only incoming LC MARC records but also any other additions (batch or on-line) to the data base. The new facility will search only the new additions rather than the entire MARC file (as the present facility does). BALLOTS users are now being polled concerning which subsets of the records added to the data base should be searched. In addition, a change to the output and purge mechanisms will make automatic selection list generation possible, since subjects and LC class will be indexed for all records.

The structure of the network file will make it possible to produce archival tapes at a substantially lower cost than at present. Under the new system it will be possible to access all of one user's records without accessing those of another. Thus, both archival and subset tapes for book, microform, or union catalogs can be generated when needed. Also, local indexes for a particular library's records will permit the user still quicker access to subsets of its records.

2. Authority Control, Phase 1

Among the LC MARC formats supported in the Network File System will be the authorities format. Introducing this format will allow selected libraries to enter authority records and will allow BALLOTS to add such MARC data as may become available. The authority file installed in Phase 1 will be searchable through the standard BALLOTS indexes, and cross-references within the file could be used to redirect a search, in the way currently done with Stanford University Libraries' cross-reference file.

Cross-reference card production for all BALLOTS users who wish it will be made possible in Phase 1 of the authority system. Thus, the present cross-reference facilities available to the Stanford Libraries will be available to other BALLOTS users, and the system will accept and display authority records for headings lacking cross-references.

3. Synchronous Communications System

The asynchronous communications system currently employed by the BALLOTS Center is an outgrowth of the local network first installed in 1972 to support the Stanford University Libraries. Experience has revealed some shortcomings in this system as a possible vehicle for long-distance communications among BALLOTS and large research libraries located across the continent. These shortcomings can be summarized as:

- Less than optimal message transmission, which has an economic impact on BALLOTS and its using institutions;
- insufficient ability to diagnose problems remotely and isolate the component in error;
- lack of redundant hardware, leading to longer than necessary down times.

To improve the stability and economy of service to its users, the BALLOTS Center is developing a replacement communications system, employing the following hardware and software technology:

- Duplicate PDP-11/60 front-end processors; one can replace the other in minutes.
- Standard DEC Operating System for the front-end processors (RSX-11M).
- A diagnostic control center for network operation and problem isolation.
- Use of standard DEC channel interfaces to the IBM 370/168 multiplexor channel.

- Use of the ADCCP link-level protocol, which is an emerging national standard.

To interface with this new system, existing Zentec 9003 terminals will be upgraded on location. The upgraded terminals, as well as new terminals, will use a software program rather than the present firmware program. It will then be possible to alter and improve the terminal program in the future without changes to the physical terminals.

4. Generalized Label Production for Book Spines

Currently, the BALLOTS Center produces spine labels for the Stanford University Libraries only. By November 1978, a generalized spine label program with a fixed number of formatting options will be available to BALLOTS network users. Initially, these labels will be produced on a line printer at the BALLOTS Center and will be mailed to libraries along with their catalog cards. At a later time, spine label production on a terminal-attached printer will be introduced.

5. Catalog Card Program Improvements

Modifications to the BALLOTS catalog card program are underway to provide the fuller services in catalog card printing desired by users. The goals of this activity include (1) easier and more economical profiling of user requirements; (2) true shelf-list card production, including complete listings of holdings; and (3) generation of extra cards as desired by on-line user request. This work will be completed in the fall of 1978.

BALLOTS BY THE END OF 1979

The following system development projects will be initiated during calendar 1979. The two major elements to be added to the production system are the second phase of the authority file subsystem and a generalized acquisitions system. Several other projects will also be undertaken that are described below.

1. Authority Linking and Control

The second phase of the BALLOTS authority project will commence following the installation of the Network File System in January 1979. The result of this effort will be support for mechanized validation of bibliographic data against an authority file; changes throughout of bibliographic data to conform to modification of authorized forms; maintenance of authority data from other sources (e.g., MESH subject headings); and automatic or semiautomatic redirection/expansion of searches from SEE and SEE ALSO references. These features are scheduled for installation in early fall 1979.

2. Generalized Acquisitions

BALLOTS currently supports a comprehensive acquisitions system for the Stanford University Libraries. Starting in early 1979, the BALLOTS Center will developed a generalized acquisitions system for other BALLOTS network member institutions, which will then have BALLOTS acquisitions support comparable to that provided to the Stanford Libraries.

3. Library Management Information Program

Analysis will begin in early 1979 to ascertain the functional requirements for a library information system reporting function in BALLOTS. This subsystem will synthesize data from all the BALLOTS processes used by a library and provide relevant statistical data to the library director. This new service will include, but will not be limited to, tracing collection growth and development, some form of book fund accounting, and monitoring general technical activity. The goal of this new subsystem will be to help the library director make resource decisions in formulating library budgets. The

development of this service is estimated to require two full-time-equivalent years.

4. Book and Microform Catalog Interface

Given the recent Research Libraries Group decision to employ BALLOTS as its technical processing system and the existence of a significant book catalog production system at the New York Public Library, Stanford University intends to incorporate the NYPL system or one of comparable capacities into the BALLOTS program. This project will be initiated early in 1979, with a planned implementation for the end of the year.

5. Research and Development on Retrospective Conversion

Stanford University has committed the BALLOTS program to resolve the issue of retrospective conversion because of the University's commitment to serve the informational needs of scholars. It is recognized that technical and economic issues must be addressed before a full implementation of retrospective conversions can be accomplished. A development team will be assigned early in 1979 to construct economic and data base models that reflect the problem. Development plans will be based on the outcome of these studies.

6. Remote Front-End Processors

To meet the needs of a research library network, the synchronous communications system now under development may be extended during calendar 1979 to support remote front-end processors, which will communicate to the BALLOTS Center via high-speed satellite or terrestrial links. It is probable that the initial installation would be on the East Coast.

7. Other Projects

The following projects may be undertaken in calendar 1979, depending on the priorities suggested to the Center by BALLOTS users and the availability of funding: support for non-roman character sets; serials control; user-defined outputs (spine labels, purchase orders, etc.); message switching; and interfaces to other systems through the National Library Network.

APPENDICES

A. History of BALLOTS
B. BALLOTS Accounts in April 1978

Appendix A

HISTORY OF BALLOTS

In 1967, following a period of rapid growth in library staff and in volume of items processed, Stanford University received a grant (and a subsequent extension) from the U. S. Office of Education (USOE) to create a flexible and reliable on-line system for bibliographic control. The focus was on supporting library technical processing in order to reduce the clerical workload by placing the burden of repetitive tasks on a machine system; using a time-sharing computer already serving several groups of users; creating an on-line system with multi-file and multi-index capabilities; and using video display units. The design of the system was to allow for its extension, in phases, from technical processing support to other areas of library operations and eventually to other libraries. Additionally, a long-term project goal was to reduce per-unit costs for acquisition and cataloging, while allowing the library to handle more materials without a proportional increase in the size of the staff.

Under the two USOE grants, a prototype acquisition system (BALLOTS--Bibliographic Automation of Large Library Operations using a Time-sharing System) was designed and implemented in collaboration with SPIRES (Stanford Public Information Retrieval System), a Stanford project funded by the National Science Foundation. BALLOTS I was operated for a nine-month period in 1969 in the Stanford University Libraries. At the end of this period, the system was evaluated and the design of the production version begun. User response to the prototype system was excellent.

In 1972, Stanford applied for and received a two-year joint grant from the Council on Library Resources and the National Endowment for the Humanities to implement a series of ten cumulative technical processing "modules" or sets of services. This work resulted in the operational BALLOTS II production system. BALLOTS has been in continuous production at Stanford since November 1972, when the first module of BALLOTS II was implemented. Since late 1974 it has provided comprehensive on-line technical processing services in the Stanford University Libraries.

In 1974-75, the system was expanded to permit searching and cataloging by libraries other than Stanford's. Much of the development work for this had been done to implement a pilot network under a contract with the California State Library. The

first BALLOTS "network" libraries using cataloging as well as searching services were seven California public libraries, known as the Public Library Automation Network (PLAN). In 1975 these libraries began searching the data base and performing cataloging through BALLOTS in order to produce catalog records on magnetic tape in MARC II communications format or a format acceptable to their own systems. These tapes were for use by the libraries' own in-house systems or by their catalog vendors, to produce book and microform catalogs.

In 1976, the University-wide Library Automation Program (ULAP) of the University of California licensed a generalized catalog card formatting program to the BALLOTS system. The acquisition of this program enabled BALLOTS to offer its users computer-produced catalog cards formatted to reflect a user's own requirements. After modifications, this program was first put into operation for the San Francisco Public Library, a PLAN BALLOTS user, in August 1976. (Note that a BALLOTS catalog card program for Stanford University Libraries only had been implemented and expanded from 1972 through 1974, and is still in use.)

During 1975-76, other institutions in California and across the country began using BALLOTS, either just to search the data base, or to search and to establish standing searches, or to catalog in order to produce tapes or catalog cards.

These initial network services did not permit the PLAN libraries or other users outside Stanford to contribute records to the BALLOTS on-line Catalog Data File; the only result was some form of computer output.

At the beginning of November 1976, the "shared cataloging" module was implemented. This expansion of the system permitted users other than Stanford University Libraries to add their catalog records to the on-line Catalog Data File and to update these records as necessary. As a result of this new service, all the libraries using the BALLOTS data base now have a choice of several libraries' cataloging of a title--they can select the record for a title that most closely meets their own cataloging requirements, and they can find cataloging representing collections strong in a number of special areas. The records stored in the on-line file can be used by any library as the basis for records of its own; each record is guarded against changes by any library but its "owner", the inputting library. Tapes or catalog cards can be produced, as the library desires. "Catalog worksheets", pages containing the information found in any on-line record, can be produced to assist in the cataloging process.

As mentioned, users that add records to the BALLOTS on-line data base can also maintain these records, making the necessary

modifications on-line when their holdings change or upgrading the bibliographic data in the record. Any library searching the BALLOTS data base therefore has access to the bibliographic records and holdings of all other institutions entered under the shared cataloging service.

From 1975 to 1977, as part of further development funded by the National Endowment for the Humanities and the Council on Library Resources, the BALLOTS Center drew up the specifications for a programmable video terminal for use with the system; identified a manufacturer-vendor for this terminal; produced the program for the terminal and the specifications for alterations in the terminal hardware (e.g., special keycaps); and monitored the production of this "BALLOTS network terminal". The first such terminals, which support the complete MARC character set and a hardcopy printer attachment, were delivered to BALLOTS users in September 1977.

In October 1977, BALLOTS' development was strengthened considerably when Stanford University reaffirmed its commitment to the program and gave BALLOTS objectives increased priority. As a result, more resources were made available to the program and BALLOTS was made a distinct department of the University, reporting to the Office of the Provost.

In November 1977, the BALLOTS software was modified by the installation of the Extended Character Set Module, which altered the system so that BALLOTS could support the special characters--symbols and diacritics--in the complete MARC character set. This module has made it possible for users to see these characters in records found in the BALLOTS data base, to input them as part of cataloging, to have them printed on catalog cards, catalog worksheets, and the variety of forms produced for Stanford University Libraries, and to have them included in magnetic tape output.

Present BALLOTS development activity, under the funding from the National Endowment for the Humanities and the Council on Library Resources, focuses on the Network File Design Module, an effort to improve the efficiency and efficacy of the system file and index structure in order to support a larger network of users; to enhance the system to accommodate additional standards and codes as issued and reflected in Library of Congress practice; and to expand the system to support additional LC MARC II formats.

A second major focus is an upgrade of the BALLOTS network communications system. This upgrade is designed to increase function, productivity, and reliability.

Appendix B

BALLOTS ACCOUNTS IN APRIL 1978

SHARED CATALOGING USERS -- searching, standing searches, addition of records to data base resulting in production of cards and/or tapes, and maintenance (revision, deletion, etc.) of those records:

Alameda County Law Library
Oakland, CA

Argonne National Laboratories
Argonne, IL

Brigham Young University
Provo, UT

Brigham Young University Law Library
Provo, UT

California State Library
Sacramento, CA

California State Library
Government Documents Section
Sacramento, CA

California State University, Fresno
Fresno, CA

California State University, Los Angeles
Los Angeles, CA

Continental Bank
Chicago, IL

East Bay Cooperative Library System
Hayward, CA

Educational Testing Service
Princeton, New Jersey

Evanston Public Library
Evanston, IL

Flagstaff-Coconino Co. Pub. Library
Flagstaff, AZ

Fresno County Library
Fresno, CA

Golden Gate University Law Library
San Francisco, CA

Golden Gate University Library
San Francisco, CA

Graduate Theological Union Library
Berkeley, CA

Hoover Institution
Stanford, CA

Lawrence Berkeley Laboratory
Berkeley, CA

Los Angeles County Law Library
Los Angeles, CA

Los Angeles County Public Library
Los Angeles, CA

Los Angeles Public Library
Los Angeles, CA

McGeorge School of Law
Sacramento, CA

Memorex Corp. Engineering Library
Santa Clara, CA

Mills College
Oakland, CA

Naval Postgraduate School
Monterey, CA

Nevada State Library
Carson City, NV

The New York Public Library
Research Division (Short Title Catalog Project)
New York, NY

North Bay Cooperative Library System
Santa Rosa, CA

Northern Trust Company
Chicago, IL

Palo Alto City Public Library
Palo Alto, CA

Quaker Oats Co. Research Laboratories
Barrington, IL

Research Libraries Group:

Columbia University
New York, NY

New York Public Library
New York, NY

Yale University
New Haven, CT

San Francisco Public Library
San Francisco, CA

San Jose City College
San Jose, CA

Santa Clara County Library
San Jose, CA

Shell Oil Company
Houston, TX

Stanford University Libraries
Stanford, CA

Stanford University
Graduate School of Business
Stanford, CA

Stanford University
Lane Medical Library
Stanford, CA

Stanford University
Law Library
Stanford, CA

Technology Development Corporation
Sunnyvale, CA

University of California, Berkeley
General Library
Berkeley, CA

University of California, Berkeley
Bancroft Library
Berkeley, CA

University of California, Berkeley
School of Law (Boalt Hall)
Berkeley, CA

University of California, Davis
General Library
Davis, CA

University of California, Davis
Health Sciences Library
Davis, CA

University of California, Davis
Law Library
Davis, CA

University of Nevada - Reno
Reno, NV

University of Santa Clara School of Law
Santa Clara, CA

Xerox Palo Alto Research Ctr.
Palo Alto, CA

SEARCHING USERS -- searching, standing searches:

Academic Book Center
Portland, OR

Allstate Insurance Company
Northbrook, IL

Allstate Insurance Company Law
Northbrook, IL

ALZA Research Library
Palo Alto, CA

American Can Company
Barrington, IL

American Water Association
Denver, CO

Amigos Bibliographic Council
Richardson, TX

AMOCO Production Company
Tulsa, OK

Armour Research Center
Scottsdale, AZ

Bank of America
San Francisco, CA

Battelle Pacific Northwest Laboratories
Richland, WA

Black Gold Information Center
Santa Barbara, CA

British Columbia Institute of Technology
Burnby, British Columbia, Canada

Brookhaven National Laboratory
Associated Universities, Inc.
Upton, NY

Case Western Reserve University
Cleveland, OH

Chevron Oil Field Research Company
La Habra, CA

Choctaw Nation Multi-County Library System
McAlester, OK

CLSI
Newtonville, MA

CONACYT - SECOBI
Consejo Nacional de Ciencia y Tech.
Mexico 20, D.F.

Cummins Engine Company
Columbus, IN

Dow Chemical Company
Walnut Creek, CA

Drexel University
Philadelphia, PA

Equitable Environmental Health, Inc.
Berkeley, CA

Federal Reserve Bank of Boston
Boston, MA

Florida State University
College of Law Library
Tallahassee, FL

Four Phase Systems
Cupertino, CA

G. D. Searle and Company
Skokie, IL

General Electric Co., FBRD Library
Sunnyvale, CA

GTE Sylvania
Mountain View, CA

Hewlett-Packard Company
Palo Alto, CA

Holmes County Schools
Lexington, Miss

Information Unlimited
Berkeley, CA

Kansas State University
Manhattan, KS

Lawrence Berkeley Laboratory
Berkeley, CA

Los Angeles County Education Center
Downey, CA

Marathon Oil Company
Littleton, CO

Metropolitan Cooperative Library System
Pasadena, CA

Mid-Mississippi Regional Library System
Kosciusko, MS

National Bureau of Standards Library
Washington, D.C.

National Judicial College Law Library
Reno, NV

National Library of Medicine
Bethesda, MD

NELINET, New England Board of
Higher Education
Wellesley, MA

Pacific Northwest Laboratories
Batelle Memorial Institute
Richland, WA

Pikes Peak Regional Library District
Colorado Springs, CO

Rand Corporation
Santa Monica, CA

Research Council of Alberta
Edmonton, Alberta, Canada

Research Library Group
Branford, CT

Rockwell International
Golden, CO

Salt Lake County Public Library
Salt Lake City, UT

San Francisco City College
San Francisco, CA

San Jose Public Library
San Jose, CA

San Mateo County Schools
Redwood City, CA

Seattle Public Library
Seattle, WA

Shell Oil Development Company
Modesto, CA

Syntex U.S.A., Inc.
Palo Alto, CA

Solar Energy Research Institute
Golden, CO

SOLINET
Atlanta, GA

South Dakota State Library
Pierre, S. D.

Standard Oil Company (Indiana)
AMOCO Research Center
Naperville, IL

Stevens Institute
Hoboken, New Jersey

Sutter County Free Library
Yuba City, CA

U. S. Department of the Interior
Office of Library Services
Washington, D.C.

U.S. Department of State
Washington, D.C.

University of California, Los Angeles
Physical Sciences & Technol. Library
Los Angeles, CA

University of California, Los Angeles
University Research Library
Los Angeles, CA

University of California, San Diego
La Jolla, CA

University of Denver Library
Denver, CO

University of Kansas Law Library
Lawrence, KS

University of Stirling
Stirling, Scotland

Utah State Library Commission
Salt Lake City, UT

Washington University Library
St. Louis, MO

West Valley Community College
Saratoga, CA

Virginia Polytechnic Institute and
State University
Blacksburg, VA

Zentec Corporation
Santa Clara, CA

INSTRUCTIONAL MODE USERS -- searching, standing searches, processing of records on-line in imitation of shared cataloging activity; no alterations actually made to data base, no outputs actually produced:

Arizona Library Extension Service
Tempe, AZ

Drexel University
Graduate School of Library Science
Philadelphia, PA

Rohm & Haas Company
Spring House, PA

Rosary College
River Forest, IL

University of British Columbia
Vancouver, British Columbia, Canada

University of California, Berkeley
School of Library and Information Studies
Berkeley, CA

University of California, Los Angeles
School of Library Science
Los Angeles, CA

University of Missouri
Information Science Department
Columbia, MO

University of Oregon
School of Librarianship
Eugene, Oregon

University of Tennessee
Knoxville, TN

University of Southern California
School of Library Science
Los Angeles, CA

University of Western Ontario
London, Ontario, Canada